MULTIMEDIA UNIVERSITY

STUDENT IDENTIFICATION NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2017/2018

BDS4614 – MANAGEMENT DECISION SCIENCE

(All sections / Groups)

5 JUNE 2018
9.00am- 12.00pm
(3 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of **5** printed pages excluding the cover page, with **5** questions only.

2. Attempt **ALL** the questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Students are allowed to use non-programmable scientific calculators (without restriction).

4. All necessary workings must be shown and please write all your answers in the answer booklet provided.

QUESTION 1

Given the following initial table of a linear programming problem (maximization problem):

C_j →		24	30	28	0	0	0	
	Solution Mix	X1	X2	X3	S1	S2	S3	Quantity
0	S1	8	4	1	1	0	0	120
0	S2	2	4	2	0	1	0	72
0	S3	4	4	2	0	0	1	80
	Z_j	0	0	0	0	0	0	0
	$C_j - Z_j$	24	30	28	0	0	0	

S1 – slack for constraint I
S2 – slack for constraint II
S3 – slack for constraint III

a. Formulate the linear programming problem from the initial table.

(4 marks)

b. Obtain the second table for the linear programming problem using the given initial table.

(4 marks)

Given the following final table

C_j →		24	30	28	0	0	0	
	Solution Mix	X1	X2	X3	S1	S2	S3	Quantity
0	S1	0	0	-2	1	2	-3	24
30	X2	0	1	1	0	0.5	-0.25	16
24	X1	1	0	0	0	-0.5	0.5	4
	Z_j	24	30	30	0	3	4.5	576
	$C_j - Z_j$	0	0	-2	0	-3	-4.5	

S1 – slack for constraint I
S2 – slack for constraint II
S3 – slack for constraint III

c. What is the optimal solution and the maximum value?

(4 marks)

d. What are the shadow prices of the three constraints and explain what do they mean?

(4 marks)

e. Determine the range for the right hand side of the second constraint without changing the solution mix.

(4 marks)
(Total: 20 marks)

Continued...

QUESTION 2

a. Kelly owns three fast food restaurants in Melaka. She is now considering where to purchase chicken wings. There are three suppliers for her to consider. The shipping cost (in RM) per chicken wing from suppliers to each restaurant, the supply from each supplier, and demand at each restaurant are shown in the following table. Kindly advise Kelly on the best option to minimise the transportation cost.

	Restaurant			
Supplier	Bukit Beruang	Kota Laksamana	Melaka Raya	**Supply**
A	1	0.5	0.9	400
B	1	0.5	0.8	400
C	1.2	0.7	0.6	150
Demand	500	200	300	

(10 marks)

b. Kelly's restaurant also provides delivery service. Kelly's restaurant received 4 delivery orders. There are four staffs available and the time (in minutes) needed by each staff to complete each order are shown in the following table. What is the optimal assignment plan? What is the minimum time needed?

	Employee			
Order	Ken	Lam	Jimmy	Tom
A	18	13	19	8
B	14	12	16	15
C	17	8	16	12
D	11	16	13	11

(10 marks)
(Total: 20 marks)

Continued...

QUESTION 3

Danny is developing a business plan to start up his Tuition Center. He has listed a number of activities that must be completed before a business plan can be developed. The activities, immediate predecessors, and time are presented in the following table:

Activity	Hours			Immediate Predecessors
	a	*m*	*b*	
A	3	6	8	-
B	2	4	4	A
C	1	2	3	A
D	6	7	8	B
E	2	4	6	C, D
F	6	10	14	E
G	1	2	4	F
H	3	6	9	F
I	10	11	12	G, H
J	14	16	20	G, H, I

a. Construct a network diagram for this problem.

(6 marks)

b. Determine the expected time, ES, EF, LS, LF and slack for each activity.

(10 marks)

c. Determine the critical path and the expected completion time.

(4 marks)

(Total: 20 marks)

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QUESTION 4

Home Realty, a real estate development firm, is considering several alternative development projects. These include building and leasing an office park, purchasing a parcel of land and building an office building to rent, buying and leasing a warehouse, building a mall and building and selling condominiums. The various development projects and their 5-year financial return (in $1,000,000s) given that interest rates will decline, remain stable or increase, are shown in the following payoff table:

Alternative	Interest Rate		
	Decline (RM)	Stable (RM)	Increase (RM)
Office park	0.5	1.7	4.5
Office building	1.5	1.9	2.5
Warehouse	1.7	1.4	1.0
Mall	0.7	2.4	3.6
Condominium	3.2	1.5	0.6

a. Determine the best investment, using the following decision criteria:

i. Maximax

(2 marks)

ii. Maximin

(2 marks)

iii. Equal Likelihood

(4 marks)

iv. Hurwicz criterion of realism ($\alpha = 0.3$)

(4 marks)

b. An economist is hired to assign a probability to each direction interest rates may take over the next five years. The economist has determined that there is a 0.5 probability that interest rate will decline, 0.4 probability that rates will remain stable, and a 0.1 probability that rates will increase. Using expected value, determine the best project.

(4 marks)

c. Determine the expected value of perfect information.

(4 marks)

(Total: 20 marks)

Continued...

QUESTION 5

The Mahogany Furniture Company produces wooden chairs. The annual demand from its store customers is 17,400 chairs. The transport and handling costs are RM2,600 each time a shipment of chairs is delivered to stores from its warehouse. The annual carrying cost is RM3.75 per chair.

a. Determine the optimal order quantity.

b. Determine the minimum total annual cost.

(4 marks)

c. The company is thinking about relocating its warehouse closer to its customers, which would reduce transport and handling costs to RM1,900 per order but increase carrying costs to RM4.50 per chair per year. Should the company relocate based on inventory costs?

(5 marks)

(11 marks)
(Total: 20 marks)

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